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ABSTRACT

A computer routine to prepare for further processing the criterion test data submitted by schools participating in the Southwest Regional Laboratory's (SWRL) Instructional Management System (IMS) tryout is described. The LOADER program--written in IBM 360 FORTRAN--reads punched cards, checks for errors, formats the input records for further processing, and produces an error message report. Included in the document are (1) a program description, (2) input and output data specifications, (3) program constraints and limitations, (4) operating instructions, (5) a system flowchart, and (6) a program listing. (DGC)

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TITLE: LOADER FOR THE TEST DESCRIPTOR FILE (LOADER)

AUTHOR: Tom Foote

ABSTRACT

This document is part of the IMS Version 3 software description. The Loader for the Test Descriptor File reads punched cards containing the criterion exercise test descriptor data for all units within all IMS programs. The card data are checked for errors, formatted into Test Descriptor Records and written to the Test Descriptor File.

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TEST DESCRIPTOR LOADER (LOADER)

1.0 - PROGRAM INDENTIFICATION

LOADER

2.0 - OBJECTIVE

Cards containing Unit Test Descriptor Data (eight cards per unit, see 5.1, Input Formats) must be read, record field pointers must be calculated and both must be merged in the form of a Unit Test Descriptor Record written both to an internal file, and out to hardcopy.

3.0 - PROGRAM DESCRIPTION

3.1 - Program Logic

LOADER reads in the Unit Test Descriptor data, one card at a time. After each reading of the first card of a unit batch, (program number) a test is made to determine whether that card represents the end of the input file (by a - 9) or the beginning of another unit's test data. The former causes the program to terminate, whereas the later leads to the reading of the rest of the cards for that unit.

After all data for a unit is read, the newly loaded arrays for that unit are scanned to count the number of meaningful elements they contain. Each such count is then used to calculate field pointers which in turn will be inserted into the Unit Test Descriptor Record, printed to hardcopy, and later used by the scoring program to point to the relevant fields within the unit record.

3.2 - Variables

Most of the following variables and arrays correspond to elements of the Unit Record. The Sample Unit Record illustrated in Appendix B should be studied in conjunction with the following variable descriptions:

IOUTBG - ITEM OUTCOME NUMBER BEGIN. This integer field pointer indicates at which word, within the unit record, the field labeled "Outcome Number" begins. Note from the Sample Unit

Record that IOUTBG will be stored with the second value (29 in the sample) of the six field pointers.

ITMBG - ITEM BEGIN. Similar to IOUTBG, this integer field pointer indicates at which word, within the unit record, the field labeled "Number of Items Per Outcome" begins. ITMBG will be stored with the third value (49 in the sample) of the six field pointers.

ITOT - ITEM TOTAL. This integer contains the value of the Unit Record Field labeled "Total Number of Items", and should indicate the total number of items contained in the unit test, for the respective unit.

IWORD (NWORD) - INTEGER WORD. This array (dimensioned for 84 elements) stores all the words contained in the Unit Record, in order to provide the read/write subroutine NTRAN with its required single array.

KEY - ANSWER KEY. This singly dimensioned array (40 elements maximum) stores all the values contained in the Unit Record, field labeled "Answer Key."

KEYBG - ANSWER KEY BEGIN. Similar to IOUTBG above, this integer field pointer indicates at which word, within the unit record, the field labeled "Answer Key" begins.

KRIBG - KRITERION BEGIN. Similar to IOUTBG, this integer field pointer indicates at which word, within the unit record, the field labeled "Criterion Level Per Outcome" begins.

KRITOT - KRITERION TOTAL. This integer stores the value contained in the Unit Record Field labeled "Criterion for Total."

KRTBG - KRITERION TOTAL BEGIN. Similar to IOUTBG, this integer field pointer indicates at which word, within the unit record, the field labeled "Criterion for Total" begins.

LEVCRI (NOC) - CRITERION LEVEL. This array (dimensioned for 20 elements) stores all the values contained in the Unit Record Field labeled "Criterion Level Per Outcome."

NIOUT (NOC) - NUMBER OF ITEMS PER OUTCOME. This singly dimensioned array (20 elements maximum) stores the values contained in the Unit Record Field labeled "Number of Items Per Outcome."

NITEM - NUMBER OF THE ITEM. Corresponding to an item on the unit test, this integer serves as the subscript for arrays KEY and NOUT.

NITOT - NUMBER OF ITEMS TOTAL. This integer appears in Do-loop 100 and is incremented within this loop in order to count the number of items within the KEY array. After comparing NITOT with ITOT, as a double check of the array sizes, NITOT is used as the upper limit of Do-loop 400, which stores the IWORD array.

NOC - NUMBER OF THE OUTCOME. This integer, corresponding to an outcome on the Unit Test, serves as the subscript for arrays NIOUT (NOC) and LEVCRI (NOC).

NOCTOT - NUMBER OF OUTCOMES TOTAL. Similar to NITOT, this integer appears in Do-loop 200 and is incremented to count the number of items within the NIOUT (NOC) array. NITOT is then used as the upper limit of Do-loop 500, which in turn stores the IWORD array in preparation for NTRAN.

NOUT (NITEM) - NUMBER OF THE OUTCOME. This singly dimensioned array (20 elements maximum) stores all the values contained in the Unit Record field labeled "Outcome Number", i.e., this array will contain the outcome numbers to which items on the Unit Test are directed.

NPROG - NUMBER OF THE PROGRAM. This two digit integer stores the value contained in the Unit Record file labeled "Program Number."

NUNIT - NUMBER OF THE UNIT. Similar to NPROG, this two digit integer stores the value

contained in the Unit Record field labeled "Unit Number."

NWORD - NUMBER OF THE WORD. NWORD is used in the operation sequence which prints hardcopy of what was written on the internal file. In addition to serving as the subscript of the unit record array IWORD, NWORD is printed immediately before the printed contents of each IWORD element in order to identify those elements.

4.0 - SUBROUTINES AND FUNCTIONS NEEDED

SUBROUTINE NTRAN (UNIT, I/O CODE, BLOCK LENGTH, BLOCK NAME RANDOM ACCESS SEQUENCE NO. MULTIPLIED BY 3). This routine is used to perform disk I/O.

I/O CODE	ACTION
1	Write Disk
2	Read Disk
6	Position Disk
10	Rewind Disk
22	NOP

The random access sequence number is multiplied by 3 because of UNIVAC 1108 to IBM 360 conversion.

5.0 - DATA SPECIFICATIONS

5.1 - Input Formats

A sample of the input data appears in Appendix A. All data should be right justified within the appropriate card field. Each unit must contain the following Test Descriptor cards, which in turn must contain the appropriate data within the format as indicated:

Card Number

```
1.      10 READ (05,11) NPROG
2.         READ (05,11) NUNIT
        11 FORMAT (12)
3.         READ (05,21) (KKY(NITEM), NITEM = 1,40)
4.         READ (05,23) (NOUT(NITEM), NITEM = 1,40)
        21 FORMAT (40A1)
        23 FORMAT (40I1)
```

```
5.          READ (05,31) (NIOUT(NOC), NOC = 1,20)
6.          READ (05,31) (LEVCRI(NOC), NOC = 1,20)
        31 FORMAT (20I2)
7. & 8.     READ (05,41) ITOT, KRITOT
        41 FORMAT (I2/I2)
```

On HR3, units 9-16, only the left half of the scanner sheet is utilized. To be consistent with the format used on units 1-8 items 2,4,6 ... 20 in NOUT and KEY are set equal to 9 on units 9-16. ITOT is set equal to 20. All other values are as defined.

After the last card of the last unit, a -9 in columns 1 and 2 of the next "Program Number Card" will signal an end-of-file to the program and trigger its termination.

5.2 - Output Formats

The unit records are written to the internal file without format control as a one dimensional array.

A sample of the disk records created appears in Intra Record Disk Words Occupied, Appendix B.

6.0 - PROGRAMMING CONSTRAINTS AND LIMITATIONS

6.1 - Programming Language

FORTRAN IV

6.2 - Vendor

Campus Computing Network at UCLA

6.3 - Storage Requirements

Less than 5000 bytes excluding system overhead.

6.4 - Hardware Configurations

360/91, card reader, disk and printer

6.5 - Program Parameters

Program parameters should not exceed the following maximums:

(1) Maximum size of test descriptor record for one unit: 84 elements

(2) Maximum number of items on the Criterion Exercise test: 40 items

(3) Maximum number of outcomes: 9

6.6 - Error Messages

If a discrepancy is detected between the number of items in KEY and the value ITOT, the following message is printed and processing is continued: 18 ITEMS COUNTED IN KEY. SHOULD HAVE BEEN 20. The number of elements in KEY (NITEM) should equal the number of elements in NOUT (NITEM). Detection of an inequality here triggers the following message though processing continues: UNEQUAL NUMBER OF VALUES IN KEY AND NOUT. Similarly, detections of inequality between the numbers of elements in NOUT (NOC) and LEVCRI (NOC) triggers the following message while processing continues: UNEQUAL NUMBER OF VALUES IN NIOUT AND LEVCRI.

7.0 - OPERATING INSTRUCTIONS

Sample run is as follows:

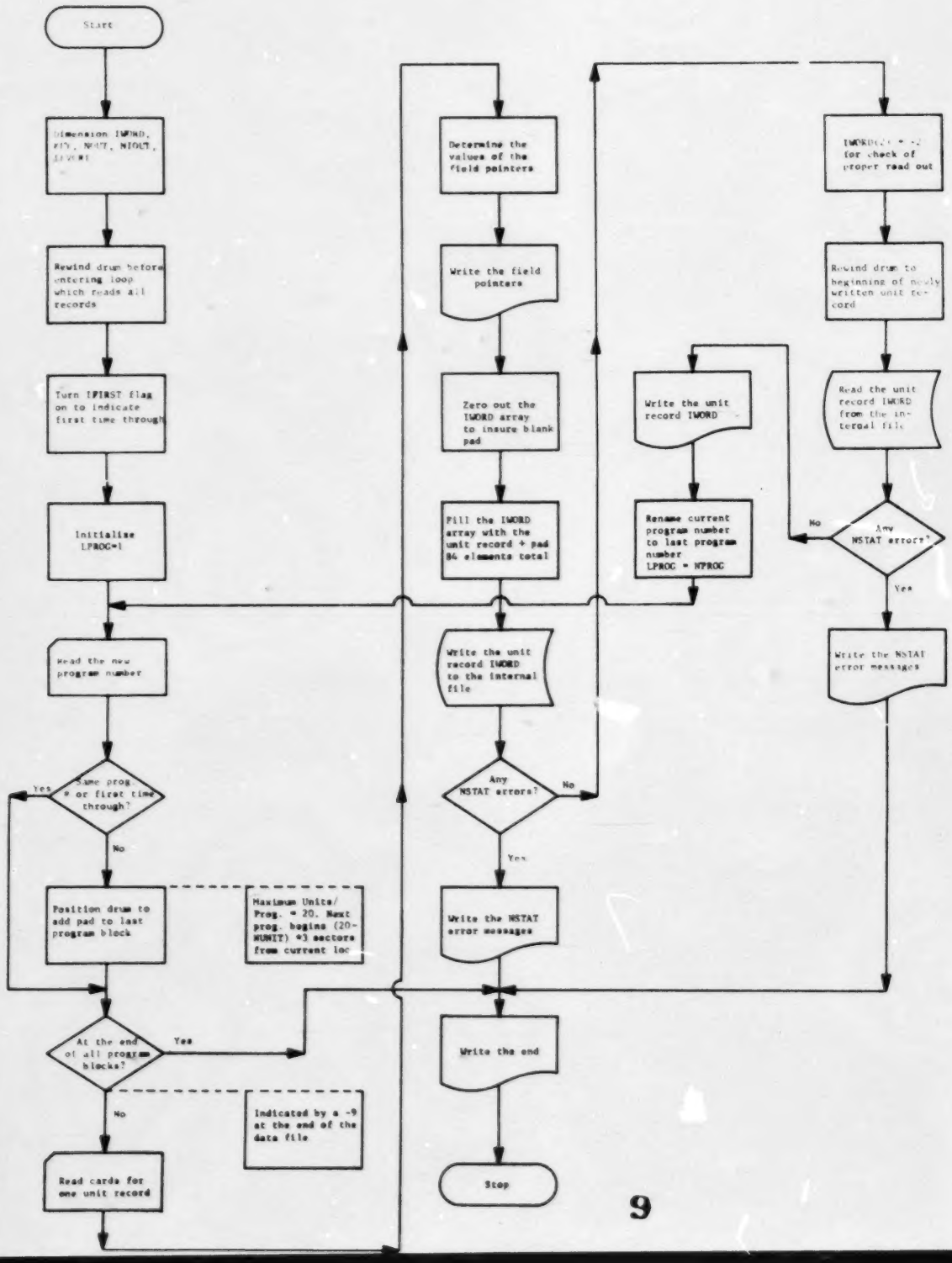
```
//
//
//
//
//
//
//SYSI
      SOURCE DECK
/*
//
//
//.SYSI
      INPUT DATA
/*
//
```

8.0 - Program Flowchart

SWRI

FLOWCHART LAYOUT FORM

PROGRAMMER: Tom Foote
PROGRAM ID: Loader for the Unit Test Descriptor
DATE: _____
PAGE ___ OF ___


Start
Dimension IWORD, KIV, NWAT, NIOUT, LEVEL
Rewind drum before entering loop which reads all records
Turn IFIRST flag on to indicate first time through
Initialize LPROG=1
Read the new program number
Same prog # or first time through?
Yes
No
Position drum to add pad to last program block
Maximum Units/Prog. = 20. Next prog. begins (20-NUNIT) *3 sectors from current loc
At the end of all program blocks?
Yes
No
Indicated by a -9 at the end of the data file
Read cards for one unit record
Determine the values of the field pointers
Write the field pointers
Zero out the IWORD array to insure blank pad
Fill the IWORD array with the unit record + pad 84 elements total
Write the unit record IWORD to the internal file
Any NSTAT errors?
No
Yes
Write the NSTAT error messages
Write the end
Stop
Write the unit record IWORD
Rename current program number to last program number LPROG = NPROG
IWORD(1) = -1 for check of proper read out
Rewind drum to beginning of newly written unit record
Read the unit record IWORD from the internal file
Any NSTAT errors?
No
Yes
Write the NSTAT error messages

```
                C  LOADER                                                          00000010
                C  READ UNIT RECORDS FROM CARDS,WRITE TO INTERNAL FILE,            00000020
                C  AND PRINT TO HARD COPY.                                         00000030
0001                COMMON K4                                                      00000040
0002                DEFINE FILE 14(1000,336,L,K4)                                  00000050
0003                DATA IBLANK/' '/                                               00000060
0004                DIMENSION IWORD(84),KEY(40),NOUT(40),NIOUT(9),LEVCRI(9)        00000070
                C  REWIND DRUM BEFORE ENTERING THE GO TO LOOP WHICH READS ALL UNIT RECOR00000080
0005                CALL NTRAN(14,10,1,IWORD,0)                                    00000090
0006                IFIRST=1                                                       00000100
                C  READ IN THE PROGRAM NUMBER OF THIS PROGRAM BLOCK                00000110
0007             10 READ(05,16) NPROG                                              00000120
                C  IF NOT EQUAL TO THE LAST PROGRAM NUMBER, ADD THE NECESSARY PAD  00000130
                C  TO THE LAST PROGRAAM BLOCK BEFORE BEGINNING THE NEW BLOCK       00000140
0008                IF(NPROG.EQ.LPROG.OR.IFIRST.EQ.1)GO TO 14                      00000150
                C  MOVE DRUM TO ADD THE REQUIRED PAD TO THE LAST PROGRAM BLOCK     00000160
0009                CALL NTRAN(14,6,1,IWORD,(20-NUNIT)*3)                          00000170
                C  IF THIS IS THE END OF ALL THE UNIT RECORDS GO TO END.           00000180
0010             14 IFIRST=99                                                      00000190
0011                IF(NPROG.EQ.-9) GO TO 101                                      00000200
                C  READ REMAINING CARDS FOR ONE UNIT RECORD                        00000210
0012                READ(05,16) NUNIT                                              00000220
0013             16 FORMAT(I2)                                                     00000230
0014                READ(05,21)(KEY(NITEM),NITEM=1,40)                             00000240
                    READ(05,23)(NOUT(NITEM),NITEM=1,40)                            00000250
                 21 FORMAT(40A1)                                                   00000260
                 23 FORMAT(40I1)                                                   00000270
0016                READ(05,31)(NIOUT(NOC),NOC=1,9)                                00000280
0019                READ(05,31)(LEVCRI(NOC),NOC=1,9)                               00000290
0020             31 FORMAT(20I2)                                                   00000300
0021                READ(05,41)ITOT,KRITOT                                         00000310
0022             41 FORMAT(I2/I2)                                                  00000320
                C  DETERMINE THE VALUES OF THE FIELD POINTERS KEYBG THROUGH KRIBG  00000330
0023                KEYBG=9                                                        00000340
0024                NITOT=0                                                        00000350
0025                  DO 100 NITEM=1,40                                            00000360
0026                IF(KEY(NITEM).EQ.IBLANK) GOTO 50                               00000370
0027                  NITOT=NITEM                                                  00000380
0028            100   CONTINUE                                                   00000390
0029             50 IF(NITOT.NE.ITOT)WRITE(06,59) NITOT,ITOT                       00000400
0030             59 FORMAT(1X,I3,' ITEMS COUNTED IN KEY, SHOULD HAVE BEEN ',I3)   00000410
0031                  IF(NOUT(NITOT+1).EQ.0.OR.NOUT(NITOT+1).NE.0)WRITE(06,61)     00000420
0032             61   FORMAT(' UNEQUAL NO. OF VALUES IN KEY AND NOUT ')           00000430
0033                IOUTBG=KEYBG+NITOT                                             00000440
0034                ITMBG=IOUTBG+NITOT                                             00000450
0035                  NOCTOT=0                                                     00000460
0036                  DO 200 NOC=1,20                                              00000470
0037                    IF(NIOUT(NOC).EQ.0) GO TO 70                               00000480
0038                    NOCTOT=NOC                                                 00000490
0039            200   CONTINUE                                                   00000500
0040             70     IF(LEVCRI(NOCTOT).EQ.0.OR.LEVCRI(NOCTOT+1).NE.0) WRITE(06,71) 00000510
0041             71     FORMAT(' UNEQUAL NO. OF VALUES IN NIOUT AND LEVCRI ')     00000520
0042                KRIBG=ITMBG+NOCTOT                                             00000530
0043                ITOTBG=KRIBG+NOCTOT                                            00000540
```

```
                KRTBG=ITOTBG+1                                                  00000550
C               WRITE THE FIELD POINTERS                                        00000560
0045            WRITE(06,81)KEYBG,IOUTBG,ITMBG,KRIBG,ITOTBG,KRTBG               00000570
0046           81 FORMAT(' FIELD POINTERS ',6(I2,4X))                           00000580
C              UNIT RECORD, IN PREPARATION FOR THE NTRAN WRITE TO THE INTERNAL FILE 00000590
C              ZERO OUT THE IWORD ARRAY TO INSURE BLANK PAD.                    00000600
0047                DO 250 NWORD=1,84                                           00000610
0048           250  IWORD(NWORD)=0                                             00000620
C              FILL THE SINGLE ARRAY IWORD WITH THE UNIT RECORD                 00000630
C              IN PREPARATION FOR THE NTRAN WRITE TO THE INTERNAL FILE          00000640
0049                IWORD(1)=NPROG                                              00000650
0050                IWORD(2)=NUNIT                                              00000660
0051                IWORD(3)=KEYBG                                              00000670
0052                IWORD(4)=IOUTBG                                             00000680
0053                IWORD(5)=ITMBG                                              00000690
0054                IWORD(6)=KRIBG                                              00000700
0055                IWORD(7)=ITOTBG                                             00000710
0056                IWORD(8)=KRTBG                                              00000720
0057                DO 400 NITEM=1,NITOT                                        00000730
0058                  IWORD(KEYBG+NITEM-1)=KEY(NITEM)                           00000740
0059                IWORD(IOUTBG+NITEM-1)=NOUT(NITEM)                           00000750
0060           400  CONTINUE                                                    00000760
0061                DO 500 NOC=1,NUCTOT                                         00000770
0062                  IWORD(ITMBG+NOC-1)=NIOUT(NOC)                             00000780
0063                  IWORD(KRIBG+NOC-1)=LEVCRI(NOC)                            00000790
0064           500  CONTINUE                                                    00000800
0065                  IWORD(ITOTBG)=ITOT                                        00000810
0066                  IWORD(KRTBG)=KRITOT                                       00000820
C              WRITE THE UNIT RECORD(NOW IN THE IWORD ARRAY) TO THE INTERNAL FILE 00000830
C              CALL NTRAN(FILENO,WRITECODE,BLKLNGTH,BLKNME,STATUSWD)            00000840
0067                CALL NTRAN(14,1,84,IWORD,0)                                 00000850
C              BACKSPACE DISK 1 RECORD                                          00000860
0068                K4=K4-1                                                     00000870
C              READ THE UNIT RECORD IWORD FROM THE INTERNAL FILE                00000880
C              CALL NTRAN(FILENO,READCODE,BLKLNGTH,BLKNME,DUMMY)                00000890
0069                CALL NTRAN(14,2,84,IWORD,0)                                 00000900
0070                WRITE(06,87)                                                00000910
0071           87   FORMAT('  IWORD ELEMENTS PRECEEDED BY THEIR SUBSCRIPTS ')   00000920
0072                WRITE(06,91) (NWORD,IWORD(NWORD),NWORD=1,KRTBG)             00000930
0073           91   FORMAT((1X,10(I2,2X,I2,2X)))                               00000940
C              GO TO THE TOP OF THE PROGRAM TO READ THE NEXT UNIT RECORD        00000950
0074                LPROG=NPROG                                                 00000960
0075                GO TO 10                                                    00000970
0076           101  WRITE(06,92)                                               00000980
0077           92   FORMAT('  ICH BIN VERTIG -- THE END')                      00000990
0078                END                                                         00001000
```

```
FORTRAN IV G LEVEL 20          NTRAN          DATE = 72067          16/57/57

                      SUBROUTINE NTRAN(IUNIT,JACT,KLEN,LBUFF,NREC)                  00001010
                      COMMON K4                                                     00001020
                      DIMENSION LBUFF(KLEN)                                         00001030
0004                  IF(JACT.EQ.1) GO TO 10                                        00001040
0005                  IF(JACT.EQ.2) GO TO 20                                        00001050
0006                  IF(JACT.EQ.6) GO TO 30                                        00001060
0007                  IF(JACT.EQ.10) GO TO 40                                       00001070
0008                  IF(JACT.EQ.22) GO TO 50                                       00001080
0009                10 WRITE(IUNIT'K4) LBUFF                                        00001090
0010                   GO TO 50                                                     00001100
0011                20 READ(IUNIT'K4) LBUFF                                         00001110
0012                   GO TO 50                                                     00001120
0013                30 K4=K4+NREC/3                                                 00001130
0014                   FIND(IUNIT'K4)                                               00001140
0015                   GO TO 50                                                     00001150
0016                40 K4=1                                                         00001160
0017                50 RETURN                                                       00001170
0018                   END                                                          00001180
```

APPENDIX A
Sample Card Input

```
01
01
122133221123123123321
11111222223333344444
05050505
05050505
20
00
01
02
232111322331213321222
11111222223333344444
05050505
05050505
20
00
01
03
132232312113213231223
11111222223333344444
05050505
05050505
20
00
01
04
131233233221212133213
11111222223333344444
05050505
05050505
20
00
01
05
121223123231331131223
11111222223333344444
05050505
05050505
20
00
01
06
113233222121112131222
11111222223333344444
```

APPENDIX B
Sample Unit Record and Variable Names

Field Name	Loader Variable Name	Sample Record Contents	Intra Record Disk Words Occupied
Program Number	NPROG	01	1-1
Unit Number	NUNIT	01	2-2
Field Pointers	KEYBG	09	3-3
	IOUTBG	29	4-4
	ITMBG	49	5-5
	KRIBG	53	6-6
	ITOTBG	57	7-7
	KRTBG	58	8-8
Answer Key	KEY (NITEM)	1,2,2,1,3,5,1,2,2,4 4,4,3,2,1,1,1,3,4,5	9-28
Outcome Numbers	NOUT (NITEM)	1,1,1,1,1,2,2,2,2,2 3,3,3,3,3,4,4,4,4,4	29-48
Number of Items Per Outcome	NIOUT (NOC)	05,05,05,05	49-52
Criterion Level Per Outcome	LEVCRI (NOC)	05,05,05,05	53-56
Total Number of Items	ITOT	20	57-57
Criterion for Total Items (o if not used)	KRITOT	18	58-58
Pad			59-84